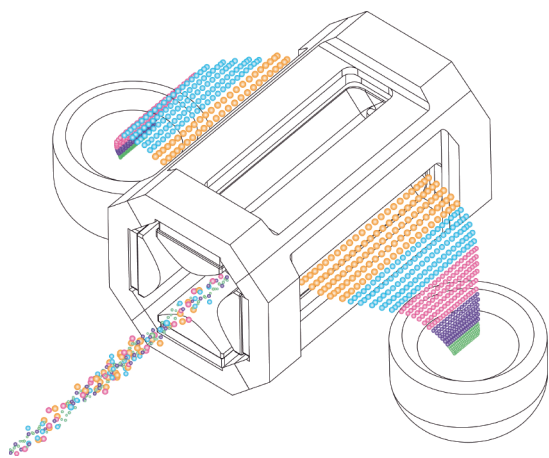


# Radial Ejection and Dual Detection on the Finnigan LTQ Linear Ion Trap Mass Spectrometer

## PSB 117

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The Finnigan™ LTQ™ two dimensional (2D) linear ion trap mass spectrometer, with its unique features, represents a major leap in ion trap technology from the traditional 3D quadrupole ion traps which have been a reliable tool for structural identification in complex matrices. The 2D linear ion trap in the LTQ is comprised of four parallel hyperbolic shaped



rods, segmented into three sections. Ions are trapped radially in a radio frequency (RF) electric field and axially in a static electric field using DC voltages. Application of appropriate voltages to all three segments generates a homogenous field throughout the trapping region. The unique geometry of this device inherently increases the ion storage capacity while producing efficient ion detection. To maximize detection of the increased number of trapped ions a mechanism for optimized ejection and detection was designed into the LTQ.

Mass analysis using the Finnigan LTQ involves ejecting the trapped ions in the radial direction through the two parallel slots in the center section of the linear ion trap. Two highly efficient detectors are optimally placed on either side of the trap to maximize sensi-

tivity. The effect of this unique feature of the LTQ is shown in Figure 1. As expected, twice as many ions are detected with two vs. one detector. Radial ejection provides efficient ejection of ions, while the dual detector system ensures the detection of the maximum number of ions.

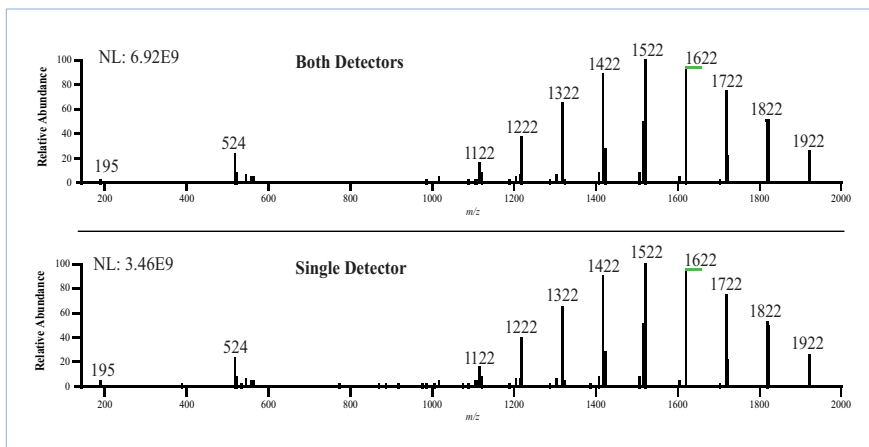


Figure 1

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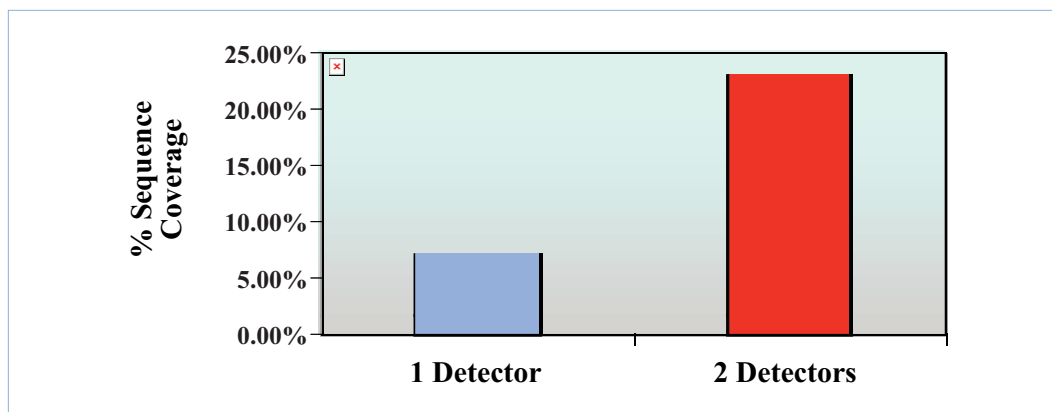


Figure 2

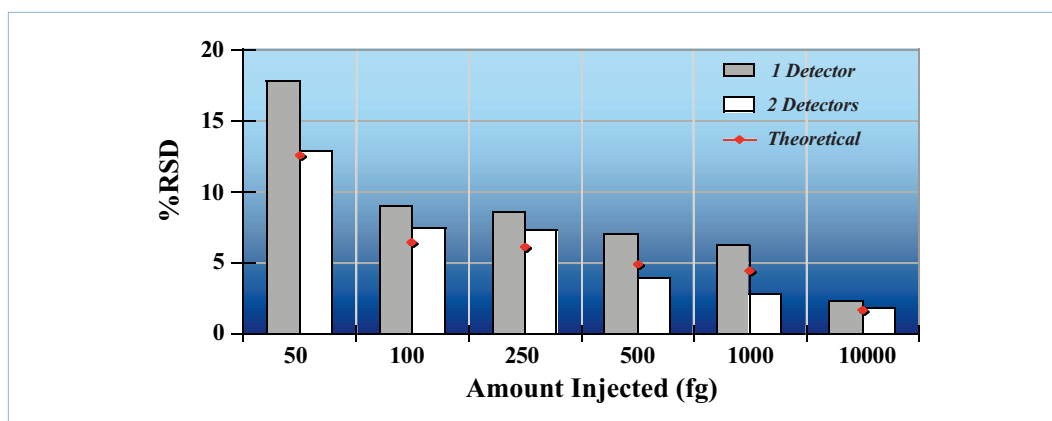


Figure 3

The result of the Finnigan LTQ's radial ejection and dual detector design is unparalleled sensitivity and enhanced sequence coverage for proteomics applications. This is illustrated by Figure 2 which shows a factor of three increase in sequence coverage, for 200 amol of myoglobin digest injected on column, when two detectors are used instead of one.

A factor of two improvement in ion statistics is reflected by the better %RSD achieved on the Finnigan LTQ as shown in Figure 3 for the quantitative analysis of alprazolam. In all cases, the %RSD is reduced relative to using one detector, and the average decrease is the expected improvement of square root 2 (or 1.4).

The novel design of the Finnigan LTQ marks an historical leap in ion trap technology to provide the scientist with exceptional analytical capability whether for proteomic profiling, metabolic studies or biomarker discovery. Improved storage capacity, trapping efficiency and detection efficiency on the Finnigan LTQ delivers unmatched sensitivity, lower limits of detection, increased dynamic range, and enhanced MS<sup>n</sup> performance.